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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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John Kevin McCoy

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EXAMINER

TSOY, ELENA

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

05/12/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/692,646	Applicant(s) MCCOY, JOHN KEVIN	
	Examiner Elena Tsoy	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 March 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4 and 6-16 is/are pending in the application.
- 4a) Of the above claim(s) 13-16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4 and 6-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>3/5/08</u> . | 6) <input type="checkbox"/> Other: _____ |

Response to Amendment

Amendment filed on March 5, 2008 has been entered. Claims 1, 2, 4, 6-16 are pending in the application. Claims 13-16 are withdrawn from consideration as directed to a non-elected invention.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Rejection of claim 11 under 35 U.S.C. 112, first paragraph because the specification does not reasonably provide enablement for unlimited increase of thermal conductivity compared to that of a fuel arrangement from pure uranium dioxide has been withdrawn due to amendment.

3. Claim 11 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 11 recites “a thermal conductivity ... is **increased** about 50 % for 10 % volume loading of silicon carbide compared to that of a fuel arrangement from pure uranium dioxide”. However, the specification as originally filed discloses at page 6, lines 3-4, that a thermal conductivity **of** 50 % is expected for 10 % volume loading of silicon carbide.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Rejection of claims 1, 4, 6-9, and 11-12 under 35 U.S.C. 103(a) as being unpatentable over GB1035789 in view of Carley-Macauly et al (US 3164487) has been withdrawn because the Examiner agrees with Applicants that fuel of GB '789 is suitable for HTGR not for light water reactor.

6. Claims 1, 4, 6-9, and 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carley-Macauly et al (US 3164487) in view of Nicholson et al (US 3, 035,325) and Mysels (US 4,073,834) for the reasons of record set forth in paragraph 7 of the Office Action mailed on 11/06/2007.

7. Claims 2 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carley-Macauly et al in view of Nicholson et al and Mysels, and further in view of Burnham et al (US 3,129,141) and Chayka (US 5952046) for the reasons of record set forth in paragraph 15 of the Office Action mailed on 2/9/2007.

8. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Carley-Macauly et al in view of Nicholson et al and Mysels, and further in view of GB '789 for the reasons of record set forth in paragraph 16 of the Office Action mailed on 2/9/2007.

Response to Arguments

9. Applicants' arguments filed March 5, 2008 have been fully considered but they are not persuasive.

Rejection of Claims 1, 2, 4, 6-9, 11-12 under 35 U.S.C. §103(a).

Rejection over GB1035789 in view of Carley-Macauley et al.

Applicant submits that as will be understood by one of ordinary skill in the art, the fuel produced with the process disclosed by GB'789 can only be used in a reactor of the type that operates with graphite matrix nuclear fuel bodies. GB'789, page 1, line 14 and 15; page 2, lines 20 to 25. As is well known to those skilled in the art, reactors that use graphite matrix nuclear fuel bodies operate at temperature in excess of 1000°C. GB'789, page 1, lines 57 to 60. Those skilled in the art will know that high temperature reactor fuel cannot be used in light water reactors. Therefore, the process disclosed in GB'789 does not and cannot provide the light water reactor fuel produced with the presently claimed method. Thus, GB'789 does not disclose or suggest the presently claimed invention.

The Examiner agrees with this argument and withdraws the rejection.

Rejection over Carley-Macauley et al in combination with Nicholson et al and Mysels

(A) Applicants submit that combination of references also fails to disclose or suggest the presently claimed invention. As will be understood by those skilled in the art, curing the arrangement, comprising the porous uranium oxide and the precursor liquid during the infiltration of the porous uranium dioxide with the precursor liquid would cause blockage of the pores of the uranium dioxide before the entire body of the porous uranium dioxide was infiltrated by the precursor liquid, resulting in an undesirable decrease in the thermal conductivity of the fuel. In contrast to the presently claimed invention, as disclosed at column 1, lines 20 to 30, Carley-Macauley discloses placing an artifact, having high open porosity and low thermal conductivity, in an atmosphere of hydrocarbon gas. While the artifact is in the atmosphere of hydrocarbon gas, an initial zone of the artifact is heated to a temperature at which carbon is deposited from the gas permeating the artifact to impregnate fully the initial zone. The temperature of the impregnated zone is then raised progressively to maintain the temperature within an advancing impregnated/non-impregnated boundary zone, and the rate of the rise in temperature in the initial zone is being limited, so that the advancing boundary zone is fully impregnated. As will be understood by those skilled in the art, as the hydrocarbon gas is carbonized and deposited in the artifact in the process disclosed by Carley-Macauley, additional hydrocarbon gas will infiltrate the artifact. This results from the placement of the artifact in the hydrocarbon gas. Curing an artifact placed in an atmosphere of a hydrocarbon gas, such that the gas infiltrates the artifact as the artifact is heated, i.e., cured, is not the presently claimed invention.

The Examiner respectfully disagrees with this argument. As acknowledged by

Applicants, Carley-Macauley places an artifact in an atmosphere of hydrocarbon gas, and then starts heating an initial zone such that carbon is deposited from the gas permeating the artifact to *impregnate fully* the initial zone, and advancing boundary zone is **fully impregnated**. Therefore,

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in contrast to Applicants assertion, Carley-Macaully reads on the step of curing after fully impregnating a porous body. It is irrelevant whether gas is present at time of curing outside the pores because claim 1 does not recite a negative limitation that no precursor should be present outside the pores.

(B) Applicants argue that Nicholson does nothing to overcome the deficiencies of Carley-Macaully. As cited in the Office Action, Nicholson discloses that a refractory body, having an intercommunicating network of pores, can be rendered less porous and more dense by depositing carbon, silicon, or silicon nitride or carbide in the pores of the body. Nicholson clearly teaches that pyrolysis of methane and other hydrocarbons is equivalent to other methods of depositing carbon in a porous body. As the deposition methods are equivalent, those skilled in the art would understand that none of the disclosed methods has any particular advantage over any of the other disclosed methods. That is, a resin impregnation and carbonizing process or a process of impregnation of the shape with furfural or the like has no particular advantage over the pyrolysis of a hydrocarbon, as disclosed by Carley-Macaully. Therefore, one of ordinary skill in the art, following the teaching of Carley-Macaully and Nicholson would have no reason to modify the disclosure of Carley-Macaully.

The Examiner respectfully disagrees with this argument. It is well settled that "The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." KSR, 127 S. Ct. at 1739, 82 USPQ2d at 1395 (2007). Applicants have presented no evidence that anything other than predictable results were obtained.

(C) Applicants assert that replacing the hydrocarbon gas disclosed by Carley-Macaully with a liquid or solid material that is then carbonized would impermissibly change the function of the process disclosed by Carley-Macaully. The hydrocarbon gas disclosed by Carley-Macaully functions in a manner significantly different from that of a liquid or solid material. A hydrocarbon gas will continue to infiltrate the pores of the artifact disclosed by Carley-Macaully as the artifact is heated. A liquid or solid will not. Thus, the process disclosed by Carley-Macaully must be changed significantly to replace the hydrocarbon gas with a liquid or solid. This is not permitted in an obviousness analysis. See M.P.E.P. §§ 2143.01 (V) and (VI).

The Examiner respectfully disagrees with this argument. First of all, Nicholson clearly teaches that pyrolysis of methane and other hydrocarbons is *equivalent* to other methods of

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depositing carbon in a porous body such as impregnation with a liquid material followed by carbonization. In other words, the hydrocarbon gas disclosed by Carley-Macauly functioning in a manner significantly different from that of a liquid material still achieves the same result (carbon deposition). Second, it is irrelevant whether a hydrocarbon gas will continue to infiltrate the pores of the artifact as the artifact is heated because heating boundary **moves away** from the deposited region, and claim 1 does not recite a negative limitation that no precursor should be present outside the pores.

(D) Applicants assert that Burnham does nothing to overcome the deficiencies of Carley-Macauly, Nicholson, and Mysels. As cited in the Office Action, Burnham discloses a fuel element that comprises a dense body consisting essentially of uranium carbide, graphite, silicon carbide, and silicon. At column 1, lines 47 to 59, Burnham discloses that the disclosed fuel element is formed as follows: A quantity of graphite bonded uranium carbide, preferably containing about 30% or more by weight uranium and the remainder carbon, is pulverized to a grain size of from 40 mesh to 200 mesh. The resulting granular product is then mixed, either alone or preferably in combination with a quantity of silicon carbide grain, with a phenol formaldehyde or other suitable resin binder. This mixture is then cold or hot pressed to the desired shape and heated in a suitable atmosphere to cure the resin drive off the volatiles. Therefore, Burnham discloses a fuel element containing silicon carbide that is prepared by mixing granular uranium carbide, and silicon carbide, and then pressing and heating the resulting mixture. Burnham fails to disclose or suggest any method of introducing silicon carbide into a porous body, or any reason one of ordinary skill in the art would replace the carbon deposited in the methods disclosed by Carley-Macauly with silicon carbide.

The Examiner respectfully disagrees with this argument. Burnham teaches that uranium carbide, graphite and silicon carbide can be used for making nuclear dense body material depending on particular use of a final product. Therefore, it would be obvious to one of ordinary skill in the art to use silicon carbide instead of or in addition to graphite for making nuclear dense body material of Carley-Macauly.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elena Tsoy whose telephone number is 571-272-1429. The examiner can normally be reached on Monday-Friday, 9:00AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Elena Tsoy, Ph.D.
Primary Examiner
Art Unit 1792

May 17, 2008

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